Erkki Kurenniemi's electronic music studio

Mikko Ojanen

Introduction

According to a well-known story, Erkki Kurenniemi was invited to build an electronic music studio for the Department of Musicology in the University of Helsinki as an unpaid voluntary assistant at some point during the academic year 1961–62. This and other details on the foundation and the early years of the university studio have been discussed several times in the academic literature (e.g. Tiits 1990, Kuljuntausta 2002, 194–199; Ojanen and Suominen 2005, 16–20). In this text I will not only revise these prior studies but also look deeper into the following questions: a) what was the concept of the studio in the 1960s, b) on what grounds did Kurenniemi start to work on the design of the university studio, c) what were the principles that guided Kurenniemi's studio design plans, and d) how did these initial plans manifest in the following years. This study focuses on the period when Kurenniemi was active at the university – although it should be pointed out that there is no exact date when he left the university studio, and his collaboration with his successor, composer Jukka Ruohomäki, and the other composers and artists in the field of electroacoustic music remained vivid until the early 1980s.

In this text I refer to the Electronic music studio of the University of Helsinki as the university studio or Kurenniemi's studio, for the studio was built and maintained by Kurenniemi, and he was practically the only one capable of using it. Consequently, it was natural that he acted as a collaborator or an assistant for the composers and artists using the studio. It is noteworthy that this is often presented as a peculiar feature of Kurenniemi's studio even though having an assistant or a dedicated sound engineer executing the actual tasks was a standard procedure in the studios of the 1950s and 1960s.

The factual content of this article relies heavily on the research of Tiits (1990), Ruohomäki ([s.a.]), Kuljuntausta (2002; 2008) and Ojanen and Suominen (2005). The concepts and theoretical pondering concerning the development and change of technology, on the other hand, have been adopted from the social construction of technology as discussed in many writings by Trevor Pinch and Wiebe Bijker as well as from the opposing framework of technological systems as described by Thomas P. Hughes (e.g. Pinch and Wieber 1987; Hughes 1994). For the sake of readability, I will not include the aforementioned references after each sentence. Instead, I encourage the reader to consult these texts whenever they wish to assess my line of argumentation.

Description and definition of a music studio

Usually, music studios are associated with a physical space consisting of at least two acoustically treated and soundproofed rooms – a recording room and a control room. Furthermore, studios are associated with music technology of some sort – physical machinery or software. Even the significance of the social interaction of its users, the relevant groups linked to its operation and development, and the roles of the different agents operating in this physical space, have been recently studied by academic writers (see e.g. Pinch and Trocco 2002). There are even some authors who have taken a somewhat deterministic stance to the research and suggest that the studio itself should be considered as an active agent in the music and record production processes (see Bates 2012).

Studios for sound recording and production can be roughly divided in two categories – commercial and experimental studios. By commercial, I refer to a facility which is developed for and focuses on audio recording and production purposes, whereas an experimental studio concentrates on sound design and the composition of experimental and electroacoustic music. Few studios can be categorized as purely one or the other, and at some point of their existence most studios have served both purposes. Nevertheless, the aforementioned division provides us with a good starting point to understand the operations of the music studio more thoroughly.

The other significant factor that can be used to define studios is their affiliations to a host organization, such as a broadcasting or record company. In some cases, the host organization even dictates the operations of the studio at the level of artistic substance. Studios that have a strong connection to their host organization are more likely to have a strong aesthetic agenda. Furthermore, other details, such as whether the studio is public or private, a large construction or a small home studio, define their operation and their contexts of use in an essential way.

Studios are distinct mainly because of their unique sound. This is due to the variety of the instruments the studio is equipped with, and in some cases the acoustic features of the studio space. The development and distribution of technology alters these sound ideals and should lead to a diverse palette of studios. However, as Schedel for example, has noticed, this has not happened, and according to her experience electronic music sounds similar all around the world (Schedel 2007, 26–28). She hopes that hardware hacking and DIY aesthetics, which have been revitalized in the last 20 years, would remedy the situation. Kurenniemi is an excellent example of these activities already from some 50 years ago.

New means of manipulating sound and the development of studio technology

Our present associations of the music studio have not existed in the same form in the history of sound recording and reproduction. Our understanding has changed as the technology and its use and abuse has changed. Probably the first futuristic vision of an experimental studio was outlined by Francis Bacon in his New Atlantis (1623) in which he described the future "sound-houses, where we practise and demonstrate all sounds and their generation. We have harmonies which you have not, of quarter-sounds, and lesser slides of sounds" (Bacon 2010, 59). It would take another 250 years for the sound recording technology to actually manifest. The ability to record sound made it possible to store, transfer, study (more thoroughly), play back and repeat unique performances as well as to manipulate sounds. Furthermore, after the invention of the gramophone, the last 150 years of human history have been audible for the first time in the cultural existence of man (for a thorough study of several aspects regarding these notions, see e.g. Sterne 2003; Katz 2010).

As the sound recording and production technology developed and became an instrument of artistic creativity, the following changes gradually took place. First, a new instrument and a new

means of musical expression were formed. Second, new composition methods were developed based on a close interaction with the machinery and the listening of the direct sonic output of the musical instruments. Furthermore, this new way of working in interaction with the instruments shifted the composer's focus from laying out the predetermined plan or score of a work to the immediate process of aesthetic decision making – in some cases even in real-time. With the new technology, composing without any formal training became possible. Furthermore, with computers and synthesizers, the composers were able to produce sounds without being a virtuoso of a traditional instrument. However, a new kind of virtuosity has gradually emerged from the use of this new technology, and in this respect it may be questionable to study new music technology in an entirely different way from the traditional instruments.

Moreover, with the new technology different processes could be automated, and the focus of the composer's work can be seen to shift from writing the actual music to conducting the technology which produced the music. In a way, the composer's role changed from an author to "an audience to the results", as described by Brian Eno (Cope 1991, 5).

It also seems that the composition and music production processes have changed from linear to cyclic. Whereas in the early days the music production process was based on recording

the well-rehearsed performance, nowadays it is more the rule than the exception that composers and producers return to a previous task of the production process over and over again during production – even editing the player's mistakes and tuning the instruments afterwards.

These new means of manipulating sound and the development of the music studio can in part be seen as preconditions for the development of electroacoustic music, but also coinciding with this development – especially in the tradition of musique concrète.

Thanks to the development of technology and electronic components, instruments and studio technology have become smaller in size and, due to mass production, cheaper. As a result of this change, music production has democratized and studios have become much more accessible. The shrinkage of the studio technology has moved the studio into laptops and other mobile devices, and due to the rapid development of networks, the studio can be interpreted to manifest even as a virtual non-space collective music production facility over the internet (see Théberge 2004). All of these trends can already be seen in Kurenniemi's visions, as we will see in the following.

Early electronic music studios in Finland

Electronic music studios were founded throughout Europe mainly under public broadcasting companies or university departments. According to the canon of studies on the electronic music, the first seminal studios are considered to be the ones in Paris, Cologne and Milan. Fortunately, recent research has also acknowledged other studios – even those with a minor or a vague input to the cultural heritage of electroacoustic music as well as studios outside Europe and North America (for more information on the history of electronic music studios see e.g. Manning 2013, Holmes 2012, Niebur 2010, Schedel 2007, Wiggen 1972). Regarding the early situation in Europe, Holmes (2012, 92–93), for example, lists nineteen studios, although he leaves the situation in Finland without mention. Davies (1967), by contrast, did acknowledge the existence of the university studio in Helsinki. Seventeen of the studio constructions mentioned by Holmes are approximately five to ten years prior to Kurenniemi's studio design and construction, while two coincide with it.

Electroacoustic music is considered to have arrived in Finland fairly late, although some experiments were made as early as at the end of the 1950s. In the Finnish Broadcasting Company, YLE, the first experiments to build an electronic music studio were

made at the turn of the 1960s, but these constructions were always temporary and lasted only for few months. Usually, the studio was constructed with an aim to carry out a certain project by a composer, who dismantled the studio after the work was completed. The first Finnish experiments to compose electronic music were made by Martti Vuorenjuuri and Bengt Johansson. Vuorenjuuri's radiophonic adaptation of Huxley's *Brave New World* (1958) was an hour-long study of the techniques of concrete music, whereas Johansson's *Three electronic etudes* (1960) was the first composition consisting of purely electronic sounds. The most serious efforts to build the studio in YLE were by Reijo Jyrkiäinen, who composed such works as *Sounds I & II* and *Idiopostic I* in his temporary studio in 1963. Although regular experimental activity, such as radiophonic seminars within YLE, started at around the mid-60s, and YLE's sound effect archive Tehosto was founded already in the late 1950s, the first permanent studio premises were only built in 1973 (See Sirén 1976, 52–53; Kuljuntausta 2008, 88–101; 132–140; 176–184; 263–271).

In the early 1960s, the construction of two parallel studio premises – Jyrkiäinen in YLE and Kurenniemi in the university – attracted attention, and some composers and artists became concerned of the situation. It was argued that instead of building two mediocre studios, all the available resources could be focused on the construction of a single, excellent studio (see e.g.

Donner in Kuljuntausta 2002, 188). The avant-garde and experimental music scene in Helsinki was small, and it is unlikely that there was a communication breakdown between the few people working in the field. It is more likely that the parallel studio projects reflect the status of electronic music in Finland at the time. In effect, only a handful of people were interested in this new art form, while the organizations which would have had the necessary resources were not (for a collection of the contemporary discussion and references to the primary material, see Kuljuntausta 2002, 303–335).

The experimental productions of the time were small underground projects in which money was not involved. Practically all of these projects were realized outside of YLE. One of the active figures in the field was the visual artist and experimental film director Eino Ruutsalo, who commissioned soundtracks for his films from Henrik Otto Donner and Kurenniemi. The music and soundtracks were made in several different studios. At least the soundtracks for the films *Kaksi kanaa* (1963) and *Hyppy* (1965) were made in the university studio. For editing the soundtracks, Ruutsalo had a bunker studio in the center of Helsinki at Iso Roobertinkatu. The musician Kaarlo Kaartinen, who frequently played in Ruutsalo's projects, also had a modest studio facility called Cinevox. Donner had access to an even more professional recording studio, Elektrovox, owned by Akkuteollisuus Ltd., which was also used

by Toivo Kärki and other leading names of the Finnish popular music scene.

Donner has explained why he worked in the different studios at the time. For him, the university studio was a place to conduct more experimental and unconventional projects, which could not be realized in YLE. At that time, YLE did not have a studio dedicated for experimentation, and the work had to be done in Tehosto or in the radio theater. The university studio provided a freer and more open environment for working without a strictly predetermined plan or an official project (Donner 2013).

The technology of the university studio and Kurenniemi's studio design plans

In our earlier studies we divided the construction of the university studio roughly into three phases (Ojanen and Suominen 2005, 18–20). In the first phase, the studio consisted of three Telefunken M24 reel-to-reel tape recorders purchased by Seppo Heikinheimo, who was a student of musicology. Kurenniemi completed the instrumentation in 1962 with a spring reverb unit, a ring modulator, a four-channel mixer board, a filter and a few oscillators built from an assembly kit. In the spring of 1963, he also bought a Studer C37 professional tape recorder. With the first studio set-up, Donner completed the soundtrack for the film *Kaksi kanaa* and tape music for his live

works *Ideogramme I* and *II*, and Erkki Salmenhaara made his first electronic work *White Label*. The first surviving composition from the university studio, the electronic tape piece *On-Off*, was completed in January 1963 by Kurenniemi. After building the first temporary studio set-up, Kurenniemi started to follow his ambitious studio design plans, which had already been in preparation for two years (Salmenhaara 1963, 55–56; Davies 1967).

Departing from his contemporaries, Kurenniemi envisioned the studio as an integrated whole of studio equipment and an automated music production facility, where sound production and control signals would be based on digital logic. The idea of automated music production and the vision of a digital music machine appear in Kurenniemi's sympathetically named first composition *On-Off*. Naturally, at this point only the name of the work refers to automated music production and digital logic, while the composition method was a live, real-time improvisation with the studio equipment on a master tape (for more information on Kurenniemi's music, see Lassfolk 2013 in this publication).

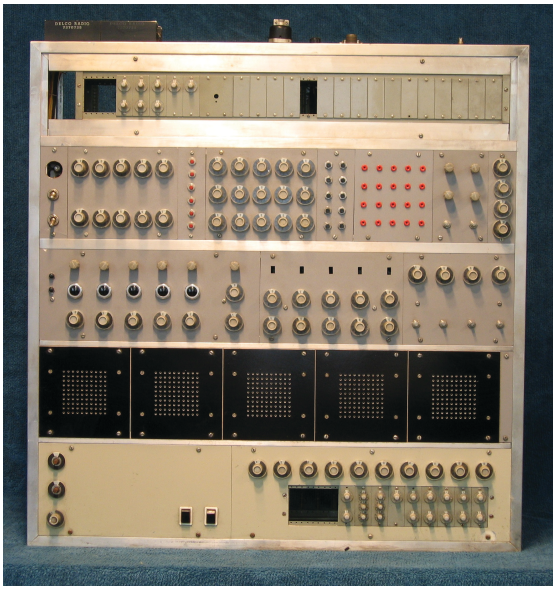
At this time Kurenniemi was aware of the technology and layout of the studios in Paris and Cologne. However, he did not want to follow the design trends of the central European studios, which were entirely based on analog electronics, for his experience as a computer programmer in the Department of Nuclear Physics

convinced him that “the future would be digital” (Kurenniemi 2004). This trend guided also the initial design of Elektronmusikstudion EMS in Stockholm Sweden (see Wiggen 1972).

Kurenniemi was also interested in algorithmic composition and wanted to build a machine capable of producing preprogrammed music with a flick of a switch. According to Essl (2007, 107), for example, “an algorithm can be defined as a predetermined set of instructions for solving a specific problem in a limited number of steps”. Algorithmic music has a long history dating back to Pythagoras and the Jewish Kabbalah, but algorithmic composition only became popular with the development of computers (ibid.; for more information on algorithmic composition, see e.g. Essl 2007; Jacob 1996).

Kurenniemi was also inspired by the RCA’s digitally controlled synthesizer, which was designed by Harry F. Olson and Herbert Belar already in the early 1950s. The design of Olson and Belar’s synthesizer was based on the mathematical theory of communication by Claude E. Shannon, and they were convinced that music could be generated mathematically (Baer 2011).

The first manifestation of Kurenniemi's integrated and automated music machine is the three-piece studio instrument, which at first did not have a name, but years later it was called the Integrated Synthesizer (see Suominen 2013 in this publication). The first version of the sound generator unit was completed in the fall of 1964, and with this newly built instrument Kurenniemi and Ruutsalo recorded the sound material for the experimental film *Hyppy* on the night following the instrument's completion (Ruutsalo/ERA 2000, 88). Later, the instrument was presented at Kurenniemi's seminar on algorithmic music, an event at the Jyväskylän kesä festival in 1965, and three years later in Sähkö-shokki-ilta (Electric Shock Evening), a happening organized by Ruutsalo in the Amos Anderson museum in early February, 1968 (Sähkö-shokki-ilta programme).



Integrated Synthesizer: Generator Unit (1964–1968)
Photo: Mikko Ojanen

In the second phase university studio was built around the Integrated Synthesizer, and it can be heard, for instance, in *Aloha Arita* (1965–66) by the Swedish composers Ralph Lundsten and Leo Nilsson, and in the two-piece composition *Saharan uni* (1967) by Kurenniemi and Kari Hakala, although this stereophonic work, which was the first of its kind in Finland, was mixed with the four tracker at the Alppi studio in Kulttuuritalo. The newly released recording from the rehearsals of Sähkö-shokki-ilta (8/2/1968) consists of long passages of Kurenniemi's improvisations and testing of the Integrated Synthesizer's generator unit (Sähkö-shokki-ilta, Ektro Records, ektro-099).

Compared with the RCA synthesizer, for example, the advantages of Kurenniemi's instrument included its compact size (although it weighed 20 kg and covered an area of one square meter) and its capability to produce rhythm patterns, melodies and harmonies in real time. The RCA Mark II synthesizer measured over two by six meters and weighed about three tons. It also had to be programmed with punched paper tape (Baer 2011; Holmes 2012; 176–190).

In the June of 1968, Kurenniemi took part in the International Convention of Experimental Centres of Electronic Music in Florence, Italy, where he presented his music terminal plans. The terminal computers were intended to allow a remote connection to a main frame located at the university. With a small fee people could contact the university computer and produce music. This would also have required some sort of digital to analog converters, which Kurenniemi was designing at the time (Zaffiri 2007). The actual terminal computers or converters were never built, but the idea re-emerged later in the digital mixer and patch bay unit DIMIX (1972). Kurenniemi's music terminal clearly anticipated the network studio as described by Théberge (2004).

The second phase of the studio and the Integrated Synthesizer remained in use until the late 1960s, although the exact date when the setup was re-arranged is unknown. Composer Jukka Ruohomäki, who started working in the university studio during

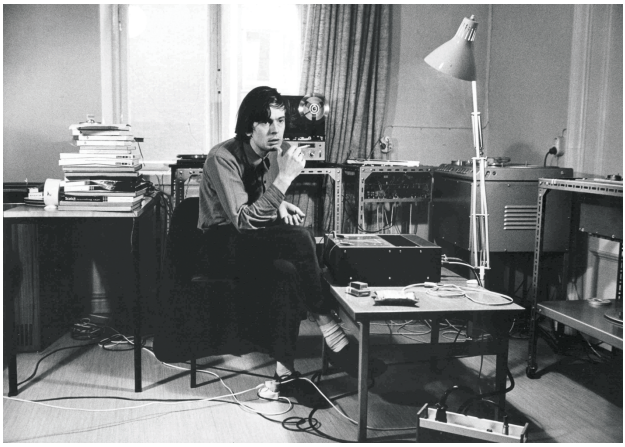
the academic year 1968–1969, does not remember the Integrated Synthesizer being used (Ruohomäki 2004). By the 1972, in the third phase, all instruments were connected to DIMIX.

Studio location	**Years**	**Maintained by**
Porthania, 6th floor	1961–	Kurenniemi (Heikinheimo)
Porthania cellar	1963 early spring–	Kurenniemi
Vironkatu 1, 1st studio	1967 spring–	Kurenniemi
Vironkatu 1, 2nd studio	1968/69–	Kurenniemi, Ruohomäki
Vironkatu 1, 3rd studio	1971/72–	Kurenniemi, Ruohomäki
Vironkatu 1, 4th studio	1974/75–	Ruohomäki
Vironkatu 7	1981–	Bentley
Vironkatu 1, floor 1B	1984–	Ruohomäki, Lassfolk, Laine, Tiits
Topelia	2013–	Lassfolk

Table1. The university studio locations.

Although Kurenniemi built the university studio and maintained it in different physical spaces (see table 1), it can be argued that Kurenniemi's actual studio design was repeatedly manifested in his musical instruments, for they are all music machines capable of producing the automated musical sequences in real time, with or without the immediate intervention of a composer. In this respect, it is questionable if the university studio as a physical space with its instruments equals Kurenniemi's conception of a studio. Furthermore, it can even be argued that the studio as a physical space was irrelevant to Kurenniemi. This distinction can be seen when he left the studio, which became maintained by his successor, Jukka Ruohomäki. Some of the instruments remained in use, but the overall layout of the studio was re-arranged closer to a traditional tape music studio. Furthermore, archive documents, such as Kurenniemi's diaries (DIMI-päiväkirja 1971–1972), a promotional description of his digital instruments (Kurenniemi 1973) and marketing letters (Kurenniemi letters), show that the central idea of his ponderings in the 1970s still had to do with the integrated, automated and modular studio entirety – ultimately designed as DIMI-U (U standing for universal), a complete studio system which could have been custom-compiled from different sound and processing modules according to the customer's needs. The resemblance to the modern DAW-based studio, which is custom-compiled from different plug-ins and software instruments by its user, is notable. However, DIMI-U units were never built (for more,

updated information of Kurenniemi's instruments, see Suominen 2013 in this publication).



Vironkatu 1, 3rd studio 1971. Photo: Martti Brandt

Vironkatu 1, 3rd studio 1973. EKA, CAA, FNG

Vironkatu 1, 3rd studio 1973. EKA, CAA, FNG

Vironkatu 1, 3rd studio 1973. EKA, CAA, FNG

Social construction of Kurenniemi's studio

Although Kurenniemi designed and built the studio and the first instruments on his own, his innovations could not have flourished without the social community he was part of. First, and importantly, the foundation of the university studio was in the hands of several people. During his school years in the late 1950s, he had an experimental studio in his school's organ balcony together with his class mates Erkki Salmenhaara and Ilkka Oramo. The trio borrowed demonstration equipment from the physics class and, being a radio amateur, Kurenniemi was capable of handling the equipment. Kurenniemi recalls that they had a wire recorder at their disposal. Unfortunately, no recordings survive from these experiments (Kurenniemi 2004).

The above story has been told many times, and it is also connected to Erik Tawaststjerna, a newly appointed Professor of Musicology, who wanted to follow the modern trends and founded an electronic music studio at the Department of Musicology. Whether the idea of founding the studio initially came from Tawaststjerna or from the young students of musicology – Salmenhaara, Oramo and Heikinheimo – remains unclear, but it is likely that a good word was put in for Kurenniemi's old class mates when it was discussed who would be suitable for executing the design and the construction of the university studio. According to Donner (2013), Tawaststjerna could see one's potential abilities, and in a way lay the ground

for this potential to emerge and develop. This happened with Kurenniemi as well. Although he did not receive any salary for the work, he had the full support of Tawaststjerna and was free to design the studio according to his plans (Kurenniemi 2004; Donner 2013).

Donner, who was Kurenniemi's close collaborator, traveled throughout Europe several times during the first years of the 1960s. Within a short period, Donner visited and worked at the electronic music studio in Bilthoven, Siemens's computer-based studio, and at the Theater of Nations in Paris with Terry Riley, who was very interested in tape loop techniques. He also worked frequently in the YLE studio for the radio theater, the Elektrovox studio and in the studios of Ruutsalo and Kaartinen that were already mentioned. Although Kurenniemi never visited the central European studios, Donner's diverse experiences of studio technology were at his disposal. During the early design, Kurenniemi and Donner formed a powerful team (Salmenhaara 1963, 55), and in this sense it seems that Donner also had a crucial part in the studio plans. However, Donner has clarified this relationship by describing that he had a utilitarian approach to electronic instruments. He did not want to know how the instrument produced the sounds, but he had a clear vision of what sounds he was interested in. The interaction between Kurenniemi and Donner was intensive. Kurenniemi

experimented with the instruments, and Donner commented on the sonic output (Donner 2013).

This kind of social interaction remained important to Kurenniemi. During the Digelius years (1970–1976; a company founded by Kurenniemi together with Peter Frisk and Jouko Kotila to build electronic musical instruments), Kurenniemi was in close collaboration, for example, with Jukka Ruohomäki, Hannu Viitasalo and several others working for Digelius. Throughout his career, Kurenniemi also interacted closely with several composers who commissioned instruments from him, such as M.A. Numminen, Ralph Lundsten and Osmo Lindeman. He was also inspired by and an inspiration for fellow visionaries, such as Knut Wiggen (a head of Elektronmusikstudion EMS in Stockholm during 1964–1976), Manford L. Eaton (conference in Florence 1968 and in later correspondence; Eaton is the author of Bio-Music, which influenced some of Kurenniemi's instrument design) and Arild Boman (used Kurenniemi's instruments in the University of Oslo and met Kurenniemi several times in the 1970s), just to mention a few names Kurenniemi was in contact and collaboration with in the 1960s and 1970s.

Conclusions

Kurenniemi is considered as a significant visionary in the field of electroacoustic music in Finland. His work set the stage for the first 15 years of Finnish electroacoustic music. For example, according to Ruohomäki ([s.a.], EH22/1) Finland would have been a developing country of electronic music without Kurenniemi's work as a designer of electronic instruments and studio technology. In the 1960s, the technology was not available, and Kurenniemi had to design his instruments from scratch by combining the potential of contemporary electronic components and the literature of recent technological developments, and by brainstorming with his close collaborators.

Scholars often describe the development of technology as a series of subsequent events (e.g. Théberge 2004, 760). These consecutive events are possible only if certain preconditions, ideas, inventions and innovations are first fulfilled or realized. Considering the situation in which Kurenniemi was envisioning his future studio, we can regard him as an agent fulfilling these preconditions, not waiting them to be fulfilled. On the other hand, considering Kurenniemi's plans to build a computer network for processing musical information over the network, certain preconditions were not fulfilled at the time in Finland. An

interesting detail is that the necessary network technology was already available and in use in the industry. It remains unclear why this early idea of distributed music production system over the network was not realized. Perhaps there were economic issues, or maybe the university administration lacked confidence in Kurenniemi's plans.

Kurenniemi's work is often associated with certain unfinishedness and even failure. Although this is justified and these descriptions outline some aspects of his work perfectly, the whole picture is more complex. Considering the development of the control signal methods, his user interface design and his ideas to build an automated and integrated modular studio entirety, Kurenniemi's work forms a determined and patient design process. Individual "unfinished" projects (a certain instrument, composition etc.) can be interpreted as manifestations of this process at a given moment. Naturally, Kurenniemi's visions were preceded with certain technological innovations, but in many cases, his ideas and design set the ground for later inventions to emerge – or they would have, if his ideas had been distributed more widely at the time.

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